

the indications calling for sterilization are bound to grow worse, never better. As a rule a woman should never be sterilized without her consent and that of her husband, and of her family or other physician. Finally, careful study of the history of the patient, especially her puerperal history, her past and present condition, will enable the physician to decide for or against primary and incidental artificial sterilization in pulmonary or other forms of tuberculosis, diseases of the kidneys or heart, mental diseases, pelvic contraction, defects in the reproductive organs due to previous labors or operations, and operations of such nature that subsequent pregnancy and labor are rendered dangerous.

PATHOLOGY AND BACTERIOLOGY

UNDER THE CHARGE OF

OSKAR KLOTZ, M.D., C.M.,

PROFESSOR OF PATHOLOGY AND BACTERIOLOGY, UNIVERSITY OF PITTSBURGH,
PITTSBURGH, PA.

The Size of the Spleen in Immune Mice.—Although the literature is full of articles upon the part played by the spleen in the growth and development of tumors, it will be found that there is no evidence so far advanced for the significance of the spleen in resistance that cannot be matched with equally good evidence against its participation. WOGLOM (*Jour. Cancer Res.*, 1919, iv, 281) gives a brief review of the chief arguments as a preface to his work on this much debated subject. Underlying all the reports of an hypertrophied spleen in tumor-bearing or immune mice is the tacit assumption that the organ was of normal size before inoculation. However, a careful study of mice and the most common mouse infection (mouse-typhoid) will reveal the fact that very few strains are free from this disease and consequently mice which are generally considered normal have enlarged spleens. The author performed a series of experiments on mice to determine the average weight of a normal spleen. The direct measurements of the organ were made by laparotomy and in order to determine whether or not the spleen enlarged after the operation two sets of animals were autopsied two and seven weeks after the incision and first measurements were made. It was found that of the two-week animals 20 per cent. developed an hypertrophied spleen and of the seven-week 50 per cent. showed a still greater enlargement of this organ. The author makes allowances for both cage infection and infection at operation but is unable to come to any definite conclusions from the data at hand. He thinks it fair to assume that laparotomy does not result in enlargement of the spleen, when done with reasonable cleanliness. After extensive experiments in which mice were inoculated with various immunizing and non-immunizing materials the author is unable to adduce any positive results. The presence or absence of an enlarged spleen in natural, as in acquired immunity, is a matter of pure chance so far as susceptibility or resistance to tumors is concerned. Splenic enlargement therefore is certainly

the effect of extraneous factors and can often be traced to mouse-typhoid. The author is not able to bring forward any argument to refute that of those who believe that the lymphocyte plays an important role in establishing a tumor immunity. He thinks the spleen might be actively engaged and yet not show participation in so far as its size is concerned. All his experiments reveal only the fact that some immune mice have enlarged spleens and some have not; some animals with progressively growing tumors have enlarged spleens and some have not. And the existence of other causes of splenic hypertrophy, such as mouse-typhoid, transfers the burden of proof to those who assert that splenic hypertrophy is referable to immunity.

Dissemination and Destruction of Typhoid Bacilli Injected Intravenously in Normal and Immune Rabbits.—STONE (*Jour. Infect. Dis.*, 1919, xxv, 284) presents the results of investigation of the mechanism of destruction of typhoid bacilli in rabbits. The author reviews the different phases in the development of the knowledge of the typhoid bacillus in its various relations to the animal organism. Rabbits were injected through the ear vein, with measured quantities of living typhoid bacilli. It was found that injection of typhoid bacilli into normal animals was followed in a small percentage of cases by fatality. The typhoid bacilli were demonstrated in all organs within one-half hour, and persisted for about fourteen days, with the exception of the gall-bladder, where they persisted beyond the eighty-sixth day. Immune animals' blood and tissues were found to be sterile within twenty-four hours after a similar injection. Repeating the work of Bull and others, similar paradoxical results were obtained, showing the bactericidal property of normal serum and the lack of same in the serum of immune animals *in vitro*, regardless of the agglutinating titre. Addition of leukocytic suspensions to immune serum *in vitro* in the presence of *B. typhi*, produced no inhibition of bacterial growth. Reactivation of immune serum by the addition of fresh normal serum in the presence of *B. typhi*, showed increased inhibition of growth relative solely to the amount of fresh serum added. Admixture of macerated tissue from immune animals to broth suspensions of typhoid bacilli, produced no inhibition of growth. Details of technic are given.

On the Mechanism of Bacterial Infections, with Special Reference to Gas Gangrene.—BULLOCK and CRAMER (*Report of Imperial Cancer Research*, 1919, vi, 23) have carried out an extensive research for determining the critical factors associated with gas gangrene. Gas gangrene, they state, is a "severe local lesion accompanied by a toxemia and followed frequently by a septicemia." The organisms chiefly responsible are *Bacillus welchii*, *Bacillus edematiens* and *Vibrio septicus*. The experiments which were carried out in mice showed that the mere presence of these organisms in a wound is not sufficient to cause the peculiar tissue reactions. Thus when the *Bacillus welchii* obtained from cultures, is washed free from the medium and by-products and is then injected into animals, no reaction of the nature of gas gangrene is obtained. But when the organisms are inoculated along with the medium in which they have grown, the typical gangrene results. The culture medium contains the toxin which assists invasion. The authors

lay stress upon the "specific" effect of the toxin upon the adrenals, which they believe is most important in relation to the fatal outcome. Various factors (cold, exhaustion, fatigue, hemorrhage and anesthesia) place an extra strain upon the adrenals and may further assist in enhancing the influence of the toxin. The toxin of gas gangrene has two separate functions. At first it acts locally in the manner of an aggresin and enables the bacteria to establish themselves in the body; later it produces a specific toxemia which with other factors contributes to the lethal issue. In the ordinary mode of infection by these organisms toxin is not immediately available to permit invasive localization. Small numbers of these bacteria alone will not cause gas gangrene. The authors have found that the accessory factor in establishing the progressive infection lies in the presence of calcium salts which are so commonly introduced in war wounds with the infection. Other substances were also found to act in a similar but less active manner. Contact between the bacteria and the calcium salt is not essential. Gas gangrene will develop if the bacterial suspension and the calcium salt are injected at different times into the same site or into different sites at the same time or at different times. The calcium salts produce a local change in the tissues disturbing the defensive mechanism against these bacteria. Injury of muscle tissue is not essential for the development of gas gangrene. The authors explain the manner of the action of calcium salts as follows: "One factor which determines the course of an infection is related to the mechanism by which the leukocytes are first guided to the focus of infection so as to surround it and then having dealt with it, are removed again and enabled to dispose of the injected bacteria. This mechanism is evidently upset by the injection of calcium salts and substances having a similar rupturing (of local defense) action. From the lesions in the bloodvessels and lymphatics indicating a stasis and the production of a clot of lymph and plasma it seems reasonable to conclude, that the disturbance of the vascular and lymphatic drainage of the tissues is responsible for the disturbance of the mechanism which presides over the movements of the leukocytes toward the focus of infection and away from it."

Observations on the Functional Activity of the Suprarenal Gland in Health and Disease.—The thesis which is supported in this paper by CRAMER (*Report of Imperial Cancer Research*, 1919, vi, 1) is that the thyroid and adrenal gland functioning together form an apparatus for the heat regulation of the body by means of their internal secretions. A study of heat regulation or heat production is not undertaken, but the author centers his attention upon the morphological changes in the adrenal and thyroid. The observations were largely carried out on mice which were subjected to cold, infection, acidosis, hemorrhage and anesthesia. Experimental hyperpyrexia was associated with congestion and partial disappearance of the colloid of the thyroid. The author describes a method for the histochemical demonstration of adrenalin within the cells of the suprarenal. Osmic acid precipitates fine granules within the cells of the medulla, which may be differentiated from fat droplets. These are spoken of as adrenalin. Lethal doses of tetrahydronaphthylamine and severe exposure to cold act as powerful stimuli to the adrenal with massive secretion. The medullary cells

discharge their adrenalin (which may be seen in the veins) and then undergo lysis. This massive discharge causes congestion of the lungs and hemorrhage. Moderate stimulation of the gland leads to an increased output without an unloading of the adrenalin contained in the medullary cells. Thus the condition of the adrenal in relation to its secretion is dependent upon the intensity of the stimulus. Somewhat similar results were obtained by infection. With a streptococcus of low virulency the suprarenal was found to be in a state of stimulation without depletion of its adrenalin, while more virulent strains and infection by the organisms of gas gangrene led to marked exhaustion of the gland both of its adrenalin content of the medulla and the lipoids of the cortex. The author found that the lipoids of the cortex played a part with the medulla in the formation of adrenalin. Following post-operative shock the suprarenal was not exhausted but its tissues were still loaded with adrenalin granules and were actively secreting these into the central vein at a time when there was low blood-pressure and a subnormal temperature. This finding is claimed to be in agreement with that of Stewart who showed that there was no alteration in the quantity of adrenalin in shock from that of a normal animal. The entire work of Cramer is based upon the morphological demonstration of the functional activity of the thyroid and adrenal. Many points will require the biological test.

The Cultivation of Recently Isolated and Laboratory Strains of Human Tubercle Bacilli on Artificial Media.—CORPER (*Am. Rev. Tbc.*, 1919, iii, 461) used for cultivation sixteen different media having a basic composition of salt, ammonium phosphate and agar. He grew human tubercle bacilli which had been artificially cultivated for about one year on this basic agar with the addition of glycerol and one of the following: defibrinated rabbit's blood, egg, ground up tissue, beef extract and peptone. Old laboratory strains six to eight years old did not grow on this basic agar with glycerol alone. Recently isolated human tubercle bacilli revealed a disposition of growing only upon a few media. They grew most constantly on the glycerol agar with the addition of egg or rabbit's blood. A few of the strains grew on all of the media on which the old cultures grew. Some of the delicate strains would not grow even when egg or rabbit's blood was added. With both the recently isolated and the old cultures there was a distinct difference in the growth ability of the different strains.

An Investigation of the Acid Fastness of Tubercle Bacilli.—EHRlich, KLEIN and MARMOREK observed that young tubercle bacilli are not acid-fast. Marmorek suggested that this was due to their not having had time to develop the fatty waxy capsule which is supposed to be responsible for the resistance to decolorization. Wherry modified this acid fastness by growing the organism on media unsuitable for the synthesis of fats and the development of the capsule. SUYENAGA (*Am. Rev. Tbc.*, 1919, iii, 473) was unable to corroborate the observations of Ehrlich, Klein and Marmorek. He transplanted a saprophytic strain of tubercle bacilli every two days from the transparent edge where the growth is younger. The medium used was glycerol agar 0.8 acid to phenolphthalein. This rapid transfer for 334 generations had little effect on

the acid fastness of the organism. Growth upon the non-nutrient and the "ameba media" used by Wherry in his work, considerably reduced the acid fastness but did not altogether destroy it. He also found that reactions of culture media, varying from 1.5 acidity to 2.0 per cent. alkalinity to phenolphthalein had little effect upon the acid fastness of the tubercle bacilli.

HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF

MILTON J. ROSENAU, M.D.,

PROFESSOR OF PREVENTIVE MEDICINE AND HYGIENE, HARVARD MEDICAL SCHOOL,
BOSTON, MASSACHUSETTS,

AND

GEORGE W. MCCOY, M.D.,

DIRECTOR OF HYGIENIC LABORATORY, UNITED STATES PUBLIC HEALTH SERVICE,
WASHINGTON, D. C.

The Prevention of Fatigue in Manufacturing Industries.—SPAETH (*Jour. of Industrial Hygiene*, 1920, vol. i, No. 9) states that the absence of a critical preliminary analysis has led to a confusion in the minds of certain physiologists between normal fatigue in industry ("industrial fatigue"), which is harmless, and cumulative fatigue, which is dangerous and may be associated with serious nervous disorders (industrial psychoneuroses). So far as we are aware there exists at present no valid quantitative physiological test for cumulative fatigue. Since normal fatigue may merge insensibly into cumulative fatigue, the reduction of normal fatigue to a minimum is the first logical step in a prophylactic attack. Normal fatigue may be reduced by a careful adaptation of all environmental factors such as illumination, ventilation, humidity, temperature, disposition of machinery, seating facilities, periods of rest, adequate and nutritious food, etc., to the physiological requirements of the workers. There is a great need for physical, physiological and psychological standardization of industrial workers by trades and processes. We have suggested a number of simple tests or types of tests that could be applied in a large variety of industries. Such tests are important for adolescents from fourteen to twenty years of age, as well as for men and women in industry. A number of physiological shortcomings of scientific management are discussed, especially the untrained type of time-study man and certain highly unscientific aspects of time and motion study methods.

Syphilis in Railroad Employees.—STOKES and BREHMER (*Jour. of Industrial Hygiene*, 1920, vol. i, No. 9) state that a general medical examination of 1763 patients of the Mayo Clinic showed 3.1 per cent. of them to have syphilitic infections obvious enough to be detected without the use of the routine Wassermann test. Four and two-tenths per cent. of the men and 2.6 per cent. of the women have